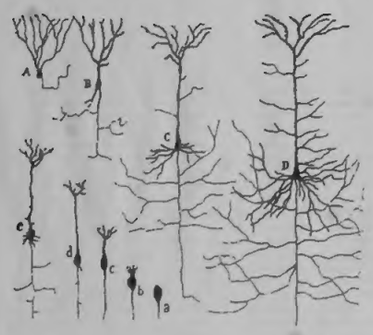
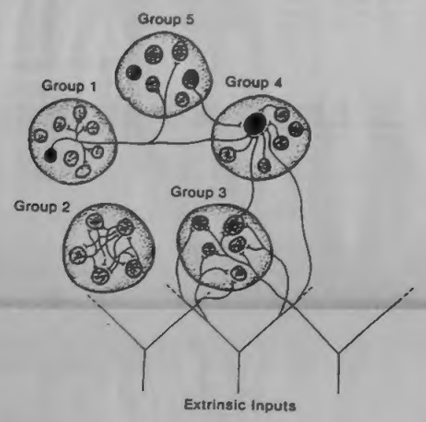


1: Pyramidal Cell

The phylogenetic and ontogenetic evolution of the pyramidal cell. The topline shows the phylogenetic development through the history of different species: the frog (A), lizard (B), rat (C), and man (D). The bottom line represents, from right to left, ontogenetic development in the mouse embryo ; embryonic neuron or neuroblast (a), beginning of the dendrite branching (b), elongation of the apical dendrite (c and d), growth of the basal dendrites and collateral branches (e). (From S. Ramon y Cajal, 1909).

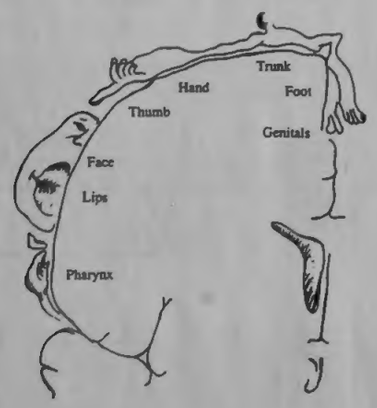
Changeux, Jean-Pierre, Neuronal Man: The Biology of Mind (Princeton, New Jersey, Princeton University Press, 1997), 267



2: Neural Darwinism

This is a schematic diagram of the properties of neuronal groups and their connectivities. Here, the point is simply to illustrate some aspects of intrinsic (within group) and extrinsic (among groups or between group and input) connectivities. Five groups are shown with some of their cells indicated. Each group illustrates a different aspect of the connectivity

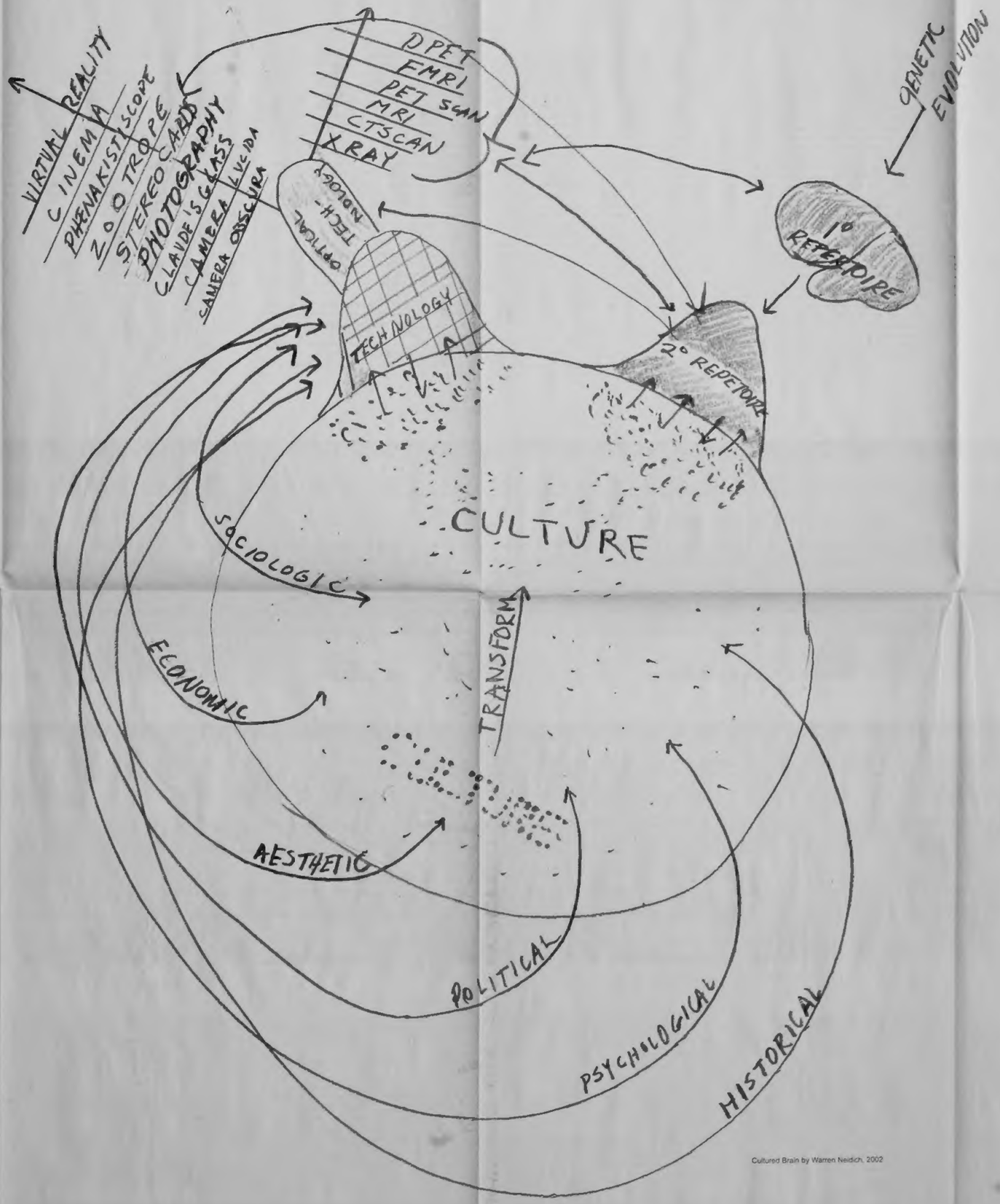
Edelman, Gerald M., The Remembered Present: A Biological Theory of Consciousness (New York, Basic Books Inc., 1989), 47.



3: Penfield Homunculus

The Penfield Homunculus graphically correlates somatic regions with areas of the somato-sensory cortex responsible for their sensory innervation. Representation of body regions are distorted in proportion to the density of cortex devoted to innervation (i.e. lips are disproportionately large relative to a normally proportioned homunculus, as a larger proportion of cortical neurons receive information from the lips than from other parts of the body).

Ramachandran, V.S., "Phantom Limbs, Neglect Syndromes, Repressed Memories, and Freudian Psychology" in Selectionism and the Brain, ed. Sporns, Olaf and Tononi, Giulio (San Diego, CA: Academic Press Inc, 1994), 304.



Cultured Brain by Warren Neidich, 2002

Remapping

Warren Neidich

September 14 - October 13, 2002

opening reception:
Saturday, September 14, 6-8 p.m.

Storefront for Art and Architecture
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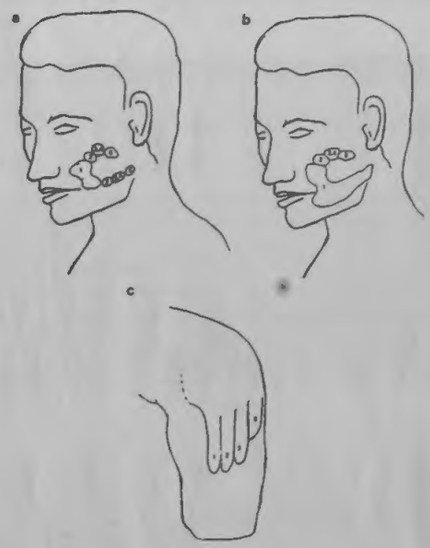


4: Reference Fields

(a) Distribution of reference fields in a patient. Notice the prominent representation of the thumb (1), which we have seen in several patients, and the roughly topographic arrangement of digits 2,3,4 and 5 on the face. This patient was nearly identical 24 hours later, but after 6 months, the representation of the some of the digits had changed noticeably (b). (c) The second map in the region of the deltoid muscle. The patients arm always felt completely extended and paralyzed. It was his ex-tessicipet into the stump

Ramachandran, V.S., "Phantom Limbs, Neglect Syndromes, Repressed Memories, and Freudian Psychology" in Selectionism and the Brain, ed. Sporns, Olaf and Tononi, Giulio (San Diego, CA: Academic Press Inc, 1994), 298.

Mirror, Mirror on the Wall

by Carlos Brillembourg

In his piece *Re-mapping*, the artist Warren Neidich observed and photographed the reflection of a Los Angeles street off the tilted glass façade of an office building. On this mirrored skin he has discovered a transformation of Renaissance perspective. Our gaze is directed through a Cartesian grid toward a new vertigo-charged, somewhat Baroque, multi-focal space. An ophthalmologist by training, Warren Neidich has remapped the city of angels.

His subject matter appears to be the banal urban realm: sidewalks, cars, trees and pedestrians. Yet, all is not what it seems. The image is read not as a reflection but as a transparency, a long horizontal window through which we look out onto a distorted street scene. But the slight distortions of cars and pedestrians seem normal.

The image is iconic like a flag. Passing cars reflected on the surface animate the grid's flat plane and we find ourselves playing an elaborate board game; one that confuses the inside and the outside, as well as our sense of optical re-cognition.

His installation at the Storefront for Art and Architecture takes this optical discovery one step further toward the realm of architecture. Neidich applied a mirrored surface to the Storefront's vertically pivoting doors. Not intended for passage, these doors have a more metaphysical function. They become an accidental instrument, for not only do they transform the optic and the social, they dissolve the public and the private. In the act of being viewed, they become a social condenser whereby each observer is at once a part of the image as well as its director and editor.

Neidich believes that the human brain evolves from a deep structure that is continuously modified by experience. This re-mapping of the brain is how culture is transmitted, through changes in the configuration of our neural patterns. By focusing on the reflected image, Neidich includes the entire world, the seen and the unseen.

As in Borges's poem *Evemess*, the mirror registers all human history.

> Everything is there. The thousand reflections
> that between dawn and twilight
> your face has left behind in many mirrors
> and those faces it has yet to leave.
> And everything is part of that diverse
> And mirroring memory, the universe;
> There is no end to its exigent corridors
> And the doors that close behind you as you pass ...

The mirror as infinity, the mirror as a perfect memory-these Borgesian metaphors come to mind in Neidich's technological mirror.

Remapping: Three Ideas

by Warren Neidich

Remapping: A Neurobiologic Definition

Remapping, as defined in neurobiology, is the process by which one area of the brain takes over the function of an adjacent area that is either damaged or lacks sensory input. For example, after the loss of a leg or foot, the area of the brain that had received those sensory inputs is now deprived of direct physical stimulation. That particular area of the somato-sensory cortex, which receives sensations of touch from the skin of the leg and foot, happens to be adjacent to the region that receives input from the genital and anal regions. In figure 3 (see overleaf), which depicts what is called the Penfield Homunculus, one can see these spatial relations clearly. For instance, the tongue and fingers are very well represented considering the small areas from which they send their inputs while the back is hardly represented at all. In certain phantom limb cases, in which an individual whose leg or arm has been amputated still feels sensation from that absent area, the individual will actually "feel" his heel and foot during sexual intercourse and/or defecation. (Figure 4, see overleaf, shows a hand remapped onto the maxillary area of the face.) Through a kind of cross wiring, the remapped area makes its presence known in the wrong neurophysiological context. Whether this is caused by sprouting new neurons or unmasking previously inhibited ones is not known. We do know from the work of Merzenich and Kaas that the reorganization of sensory pathways can take place up to perhaps 1 cm. This implies quite a large degree of neuroplasticity. (1)

Superimposed on this anatomical/physical plasticity is another explanation, which reflects the brain's ability to reconfigure its inputs and outputs. To be sure, the foot and leg have non-physical, immaterial functions as well. For example, losing a leg does not put an end to dreams of running. Remapping may have a broader definition that relates to redistribution of neural relations through changed routes of neural connectedness or reentrant temporal relations. By means of neurophysiological processes remapping sustains the functionality of many neural networks, such as the foot and leg. After a foot is amputated sensory stimulation coming from it is terminated. However, there are thousands if not millions of memories or memory fragments of its past sensorial effect distributed throughout the nervous system. The non-physical facets of foot, leg and heel are woven into a network of other immaterial relations such as feelings and emotions that in the end, together with their physical mnemonic counterparts, form extremely complex narratives. For instance we are all familiar with the way the heel of a shoe or a silk stocking can play symbolic roles in a meta-narrative in which these objects are substituted for the female genitalia. Ramachandran has suggested that remapping could provide a neurobiological explanation or counterpart to the psychoanalytic narrative as an explanation of the foot fetish.(2)

Remapping: The Aesthetic Definition

My concept has two stages: the remapping of cinema into architecture, and the subsequent construction of the post-modern observer. In my photographic series, *Remapping*, the metaphor of cinema being remapped onto architecture is extensive. Frames or pictures of a building at 8737 Beverly Boulevard in Los Angeles, California have been digitally sewn together into a seamless image. The fictive building which results exists solely as the result of this conjoining of real subunits into a fictive whole. The process is analogous to the editing and splicing techniques of filmmaking. In fact, the building takes on the character of the film strip, identified by a time code (8737), as elements and figures within the reflection reappear in a repetitive, frame-like sequence. Here, multiple narrative constructions include the overflow of elements from one section into the next, an overflow specifically relevant to the switch from analog to digital modes of editing and filmmaking. This technological leap from analog to digital modes has spawned digital cognitive models, reflecting in turn a paradigmatic shift from linear thinking to parallel processing.

The building as a fictional construction mirrors film and its multiple narrative structures; the allusion to cinematic fiction is reinforced by the projection of elements onto the screen/mirror that comprises the skin of the building. The fictive building exists purely for the sake of the virtual image. The continuous flow of the "real" unfurling at street level is continuously reflected by the building itself in a grand cinematic gesture. The building, in other words, also acts as an optical device, projecting back images into the retinas and brains of passers-by, who are brought into the line of action. This transition from the building to the retina marks the final step of the remapping process.

Constructing the Postmodern Observer

"I am proposing the notion that we are here in the presence of a mutation in built space itself. We ourselves, the human subjects who happen into this new space, have not kept pace with that evolution; as yet, no equivalent mutation in the subject has followed the mutation in the object. We do not yet possess the perceptual equipment to match this new hyperspace, as I call it, in part because our perceptual habits were formed in the older space of high modernism. There is therefore a biological imperative to grow new organs, to expand our sensorium, in the face of our new architectural and cultural habitat." Fredric Jameson (3)

The twentieth century was the century of photography, film and most recently, virtual reality and computer-generated environments. Photography and film are omnipresent in the urban landscape. Anyone visiting Times Square in New York City cannot but be amazed at the transformation of the building skins into an ever-morphing, mutating cinematic display field made up of vast photo-collaged billboards and digital video screens. This cinematic field and now the virtual field, produced as they are by an array of image-generating technologies, has altered the world of real relations and remapped itself upon the urban landscape. This turn of events is just the latest manifestation of a genealogy of such interdisciplinary mappings that have come to define contemporary life. Indeed, our understanding of neural networks increasingly reflects the cinematic and virtual nature of our world.

Through a process referred to as "neuronal group selection," proposed by the neurologist Gerald Edelman, the genetically inherited set of neural networks we are born with–the primary repertoire–is repetitively stimulated by objects from the external world. This repeated stimulation confers selective advantages (figure 1, see overleaf). In this way those that are stimulated crowd out those that are not in the competition for neural space, creating what is called the secondary repertoire (figure 2, see overleaf). As cinema and new media become more and more prevalent and recur constantly in the visual landscape, they drive these Neural Darwinistic processes. These stimuli are what Paul Virilio calls phatic stimuli–stimuli that are artificially made to make a person pay attention to them. These cinematic and virtual phatic stimuli change temporal and spatial relations. For example the use of montage, double exposure and the characteristics of transparency invented in cinema become superimposed onto architectural structures as well as becoming models for the configuration of space on a computer screen. These and other new concepts of space and time become the template upon which the brain, and perhaps the mind, of the twentieth century observer is now configured. Processes like reentry, which already exist as a way of temporally linking disparate areas of the brain such as the visual cortex and motor cortex, may be reconfigured and readjusted to reflect novel temporal strategies that link stimuli in the world connected through cinematic time strategies.

Therefore, the modernist observer cannot understand the postmodern object–it is beyond the ability of a nervous system sculpted by modernist spatial and temporal paradigms to perceive and comprehend it adequately. That full appreciation must wait for a future generation of observers: generations whose neurological structure has been sculpted by contemporary culture (see drawing, *The Cultured Brain*, overleaf). This is the true meaning of the technologic sublime. Only with this mutated brain can the post modern object be understood. In the twentieth century, it is the object formed on the screen and moving therein as an immaterial presence, almost an apparition, that forms the objects and their relationships in the visual landscape that fine-tunes the post modern observer.

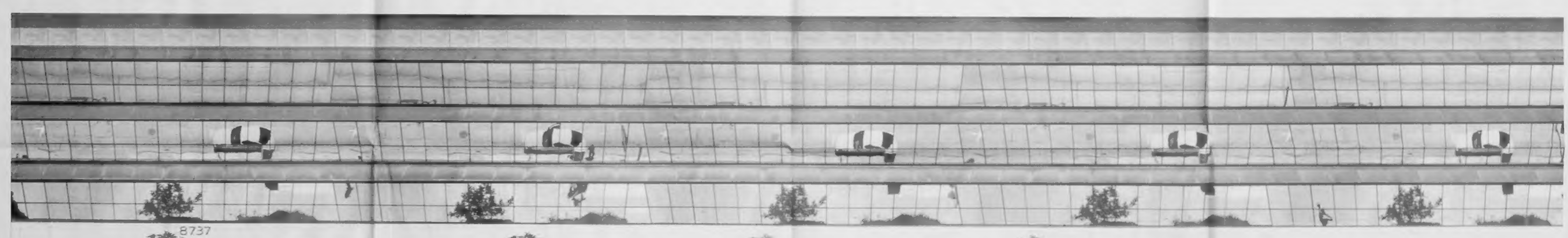
Notes

1. Merzenich, M.M., and Kaas, J.H. "Reorganization of Mammalian Somatosensory Cortex Following Peripheral Nerve Injury". Trends Neuroscience 5:434-436, 1982.

2. Phantom Limbs, Neglect Syndromes, Repressed Memories, and Freudian Psychology. V.S. Ramachandran, in *Selectionism and the Brain*, ed. Olaf Sporns and Giulio Tononi, Academic Press 1994.

3. *Postmodernism or The Cultural Logic of Late Capitalism*. Fredric Jameson, Duke University, 1990.

Warren Neidich's collected writings entitled "Blow-up, Photography, Cinema and the Brain" with an introduction by Norman Bryson will be published in the fall of 2003 by DAP and the California Museum of Photography in conjunction with the Ford Foundation.



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